CLAIMS

1. A teat cup (1) comprising a flexible liner (3) for engaging about a teat of an animal to be milked, said liner having a head portion (6), at one end, provided with a mouth (7) through which the teat is engageable with the liner, and a milk discharge passageway (4a) at the opposite end, and nozzle means (13) for discharging fluid into the liner (3), characterised in that said nozzle means (13) is arranged to discharge fluid into the head portion (6) of the liner.

2. A teat cup as claimed in claim 1, wherein the head portion (6) of the liner has an internal annular cavity (9) which, when the teat cup is engaged with an animal's teat, forms a void (10) between the side of the teat and the interior of the head portion, and wherein the nozzle means (13) is arranged to discharge fluid into the cavity (9) in the head portion.

3. A teat cup as claimed in claim 1 or 2, wherein the nozzle means (13) is arranged to discharge fluid in a direction towards the discharge passageway (4a) of the liner (3).

4. A teat cup as claimed in claim 1, 2 or 3, including a non-return valve (35) connected to the nozzle and via which fluid is supplied to the nozzle means.

5. A teat cup as claimed in any preceding claim, including a shut-off valve (20) connected to the discharge passageway (4a) of the teat cup for shutting off fluid flow from the teat cup into a milk tube downstream of the teat cup.

6. A teat cup as claimed in claim 6, wherein the shut-off valve (20) comprises a valve body (21) having a milk passageway (22) connected to the liner (3), a valve chamber (25) in the valve body connected to the milk passageway via an opening (26) in the wall of the passageway (22), a valve member (27) in the form of a flexible membrane disposed in sealing relation between the chamber (25) and the opening (26), and means (29) for connecting the chamber to a source of fluid pressure, whereby the application of fluid pressure to the chamber (25) extends and/or expands the membrane through the opening (26) into the milk passageway so that it seals the passageway (22) and shuts off fluid flow therethrough.

7. A teat cup as claimed in claim 6, wherein the membrane valve member (27) has a cap-like shape which, in the unactuated position of the valve member, projects into the valve chamber (25) with the cavity in the cap facing the passageway (22), whereby application of fluid pressure to the chamber (25) turns the cap valve member inside out so as to project across the passageway (22) in sealing relation with the wall or walls of the passageway.

8. A teat cup as claimed in claim 6 or 7, wherein the valve chamber (25) is connectable to a source of vacuum upon removal of the fluid pressure from the chamber, whereby to return the membrane (27) to its unactuated position within the valve chamber.

9. A teat cup as claimed in any preceding claim 5 to 8, including a drain port (37) on the upstream side of the shut-off valve for enabling trapped fluid to drain from the liner (3) in the event of the teat cup being held in a position in which the head portion (6) of the liner is uppermost, said drain port being controlled by a non-return valve (38).

10. A teat cup as claimed in claim 9, wherein the non-return valve is a flap valve (38).

11. A teat cup as claimed in any preceding claim, wherein the nozzle means comprises a single nozzle (12).

12. A teat cup as claimed in any preceding claim, including a delivery tube (14) connected to the nozzle means (13) for supplying fluid thereto, said delivery tube being attached to or integral with the teat cup.

13. A milking cluster comprising a plurality of teat cups (1) as claimed in any preceding claim, a plurality of short milk tubes (11) respectively connecting the discharge passageways (4a) of the teat cups to a clawpiece which collects milk discharged from the teat cups preparatory to onward delivery.

14. Milking equipment comprising a plurality of milking clusters as claimed in claim 13, wherein the clawpiece of each milking cluster is connected to a milk collection chamber of the equipment.

15. A method of milking comprising the steps of applying a teat cup (1) to a teat of an animal to be milked, said teat cup including a flexible liner (3) engaging about the teat, and having a head portion (6), at one end, provided

with a mouth (7) through which the teat is engaged with the liner, and a milk discharge passageway (4a) at the opposite end, activating the cup to perform a milking operation, and discharging treatment fluid into the liner (3) and withdrawing the teat cup from the teat when milking is terminated, characterised in that the treatment fluid is discharged into the head portion (6) of the teat cup (1) and on to the teat prior to and/or as the teat cup is withdrawn, such that withdrawal of the teat cup from the teat wipes the fluid down the teat.

16. A method as claimed in claim 15, including detecting when milking is to be terminated and, in response to said detecting step, withdrawing the teat cup (1) from the teat and discharging treatment fluid into the head portion (6) of the teat cup and onto the teat such that withdrawal of the teat cup from the teat substantially coats the teat with the treatment fluid

17. A method as claimed in claim 15 or 16, wherein the treatment fluid is discharged into a void (9) formed between the teat and the head portion (6) of the liner (3).

18. A method as claimed in claim 15, 16 or 17, wherein the discharge of fluid into the head portion (6) of the teat cup is controlled by a non-return valve.

19. A method as claimed in claim 15, 16, 17 or 18, including the steps of allowing the teat cup (1) to fall into an inverted position, after withdrawal from the teat, with the head portion (6) of the teat cup being directed downwardly, and flushing the interior of the liner (3) with treatment fluid, washing and/or drying fluid discharged upwardly into the liner from the head portion (6).

20. A method as claimed in any preceding claim 15 to 19, including the step of shutting off the discharge passageway (4a) of the liner (3) upon withdrawal of the teat cup so as to prohibit fluid from contaminating harvested milk.

21. A method as claimed in any preceding claim 15 to 20, including the step of applying a pulse of compressed air to the interior of the head portion (6) of the liner, subsequently to the discharge of fluid thereinto, so as to facilitate removal of the teat cup (1) from the teat.

AMENDED CLAIMS

[received by the International Bureau on 7 April 2005 (07.04.05),
original claims 1 to 21 replaced by new claims 1 to 25 (4 pages)]

+ STATEMENT

1. A teat cup (1) comprising a flexible liner (3) for engaging about a teat of an animal to be milked, said liner having a head portion (6), at one end, provided with a mouth (7) through which the teat is engageable with the liner, and a milk discharge passageway (4a) at the opposite end, and nozzle means (13) for discharging fluid into the head portion (6) of the liner, characterised in that the nozzle means (13) is arranged to discharge fluid in a direction towards the discharge passageway (4a) of the liner (3).

2. A teat cup as claimed in claim 1, wherein the head portion (6) of the liner has an internal annular cavity (9) which, when the teat cup is engaged with an animal's teat, forms a void (10) between the side of the teat and the interior of the head portion, and wherein the nozzle means (13) is arranged to discharge fluid into the cavity (9) in the head portion.

3. A teat cup as claimed in claim 1 or 2, including a non-return valve (35) connected to the nozzle means and via which fluid is supplied to the nozzle means.

4. A teat cup as claimed in claim 1, 2 or 3, including a shut-off valve (20) connected to the discharge passageway (4a) of the teat cup for shutting off fluid flow from the teat cup into a milk tube downstream of the teat cup.

5. A teat cup as claimed in claim 4, wherein the shut-off valve (20) comprises a valve body (21) having a milk passageway (22) connected to the liner (3), a valve chamber (25) in the valve body connected to the milk passageway via an opening (26) in the wall of the passageway (22), a valve member (27) in the form of a flexible membrane disposed in sealing relation between the chamber (25) and the opening (26), and means (29) for connecting the chamber to a source of fluid pressure, whereby the application of fluid pressure to the chamber (25) extends and/or expands the membrane through the opening (26) into the milk passageway so that it seals the passageway (22) and shuts off fluid flow therethrough.

6. A teat cup as claimed in claim 5, wherein the membrane valve member (27) has a cap-like shape which, in the unactuated position of the valve member, projects into the valve chamber (25) with the cavity in the cap facing the passageway (22), whereby application of fluid pressure to the chamber (25) turns the cap valve member inside out so as to project across

the passageway (22) in sealing relation with the wall or walls of the passageway.

7. A teat cup as claimed in claim 5 or 6, wherein the valve chamber (25) is connectable to a source of vacuum upon removal of the fluid pressure from the chamber, whereby to return the membrane (27) to its unactuated position within the valve chamber.

8. A teat cup as claimed in any preceding claim 4 to 7, including a drain port (37) on the upstream side of the shut-off valve for enabling trapped fluid to drain from the liner (3) in the event of the teat cup being held in a position in which the head portion (6) of the liner is uppermost, said drain port being controlled by a non-return valve (38).

9. A teat cup as claimed in claim 8, wherein the non-return valve is a flap valve (38).

10. A teat cup as claimed in any preceding claim, wherein the nozzle means comprises a single nozzle (12).

11. A teat cup as claimed in any preceding claim, including a delivery tube (14) connected to the nozzle means (13) for supplying fluid thereto, said delivery tube being attached to or integral with the teat cup.

12. A milking cluster comprising a plurality of teat cups (1) as claimed in any preceding claim, a plurality of short milk tubes (11) respectively connecting the discharge passageways (4a) of the teat cups to a clawpiece which collects milk discharged from the teat cups preparatory to onward delivery.

13. Milking equipment including a milking cluster comprising a plurality of teat cups (1), each of which comprises a flexible liner (3) for engaging about a teat of an animal to be milked, the liner having a head portion (6), at one end, provided with a mouth (7) through which the teat is engageable with the liner, and a milk discharge passageway at the opposite end, nozzle means (13) for discharging fluid into the head portion (6) of the liner, a plurality of short milk tubes respectively connecting the discharge passageways of the teat cups to a claw piece which collects milk discharged from the teat cups for onward delivery, and a cluster remover for effecting take-off of the cluster from the animal's udder, characterised by control means for initiating supply of treatment fluid to the nozzle means of the teat cups as the teat cups are

withdrawn from the teats so that withdrawal of the teat cups wipes the fluid down the teats.

14. Milking equipment as claimed in claim 13, wherein the nozzle means (13) of each teat cup is arranged to discharge fluid in a direction towards the discharge passageway (4a) of the associated liner (3).

15. Milking equipment as claimed in claim 13 or 14, including a non-return valve (35) connected to the nozzle means and via which fluid is supplied to the nozzle means.

16. Milking equipment as claimed in claim 13, 14 or 15, wherein the nozzle means of each teat cup comprises a single nozzle (12) directed into an internal annular cavity (9) within the head portion (6) of the associated liner.

17. Milking equipment as claimed in claim 13, 14, 15 or 16, including a shut-off valve (20) connected to the discharge passageway (4a) of each teat cup for shutting off fluid flow from the teat cup to the claw piece.

18. Milking equipment as claimed in claim 17, including a drain port (37) on the upstream side of each shut-off valve for enabling trapped fluid to drain from the associated liner (3) in the event of the teat cup being held in a position in which the head portion (6) of the liner is uppermost, said drain port being controlled by a non-return valve (38).

19. A method of milking comprising the steps of applying a teat cup (1) to a teat of an animal to be milked, said teat cup including a flexible liner (3) engaging about the teat, and having a head portion (6), at one end, provided with a mouth (7) through which the teat is engaged with the liner, and a milk discharge passageway (4a) at the opposite end, activating the cup to perform a milking operation, and, when the milking operation is terminated, discharging treatment fluid into the head portion (6) of the liner (3) and withdrawing the teat cup from the teat, characterised by discharging treatment fluid into the head portion (6) of the teat cup (1) and on to the teat as the teat cup is withdrawn, and utilising withdrawal of the teat cup to wipe the fluid down the teat.

20. A method as claimed in claim 19, including detecting when milking is to be terminated and, in response to said detecting step, withdrawing the teat cup (1) from the teat and discharging treatment fluid into the head portion (6)

of the teat cup and onto the teat such that withdrawal of the teat cup from the teat substantially coats the teat with the treatment fluid.

21. A method as claimed in claim 19 or 20, wherein the treatment fluid is discharged into a void (9) formed between the teat and the head portion (6) of the liner (3).

22. A method as claimed in claim 19, 20 or 21, wherein the discharge of fluid into the head portion (6) of the teat cup is controlled by a non-return valve.

23. A method as claimed in claim 19, 20, 21 or 22, including the steps of allowing the teat cup (1) to fall into an inverted position, after withdrawal from the teat, with the head portion (6) of the teat cup being directed downwardly, and flushing the interior of the liner (3) with treatment fluid, washing and/or drying fluid discharged upwardly into the liner from the head portion (6).

24. A method as claimed in any preceding claim 19 to 23, including the step of shutting off the discharge passageway (4a) of the liner (3) upon withdrawal of the teat cup so as to prohibit fluid from contaminating harvested milk.

25. A method as claimed in any preceding claim 19 to 24, including the step of applying a pulse of compressed air to the interior of the head portion (6) of the liner, subsequently to the discharge of fluid thereinto, so as to facilitate removal of the teat cup (1) from the teat.

Statement under Article 19(1) PCT

The present invention is concerned with the cleaning and/or disinfecting of animal's teats and teat cups, post-milking. Independent claims 1, 13 and 19 are directed to apparatus and a method devised for this purpose and have been drafted to distinguish the invention from cited document D1 (EP-A-0 277 396) relied on as an anticipation. D1 is primarily directed to the washing of animal's teats before milking. Insofar as D1 mentions washing, post-milking, it would be clear to the skilled reader that D1 intends this to be performed with the teat cup 23 of D1 remaining in engagement with a teat and the valve 34 in the position to discharge washing liquid to the waste line 35. When washing is complete, the valve 34 is switched to place the teat cup in contact with ambient pressure, via the bleed opening 19, so that the cup drops off the teat. There are no clear and unambiguous directions in D1, implicit or otherwise, to wash the teats of an animal, post-milking, by discharging treatment fluid into the head of the teat cup as the latter is withdrawn from a teat and utilising withdrawal of the teat cup to wipe the fluid down the teat, thereby coating the teat with the treatment fluid. This is the essence of the present invention and independent claims 1, 13 and 19 are directed to apparatus and a method suitable for performing such washing, post-milking.